

DIVISION 4 MASONRY GUIDE SPECIFICATION

SECTION 04810 UNIT MASONRY ASSEMBLIES

[Note: This specification is intended as a design guide to Architects and Engineers performing work for the Department of Buildings and General Services. The Architect and Structural Engineer of record, must take responsibility for designing a complete integrated wall system specific to each project. Date of most recent revision: 4-9-04 by JPO, keeper of this spec.]

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 1 spec sections, apply to this Section.

1.2 SUMMARY

- A. This section encompasses unit masonry assemblies consisting of the following:
 - 1. Fired clay face brick
 - 2. Fired clay brick pavers: pedestrian & lt. vehicular; heavy vehicular
 - 3. Concrete masonry units
 - 4. Mortar and grout
 - 5. Masonry reinforcing steel
 - 6. Masonry joint reinforcement
 - 7. Masonry connectors
 - 8. Through-wall flashing
 - 9. Miscellaneous masonry accessories
 - 10. Cavity wall insulation

1.3 RELATED SECTIONS

- A. Related Work Specified Elsewhere:
 - 1. Division 3 Concrete
 - 2. Division 5 Metals
 - 3. Division 6 Wood & Plastic
 - 4. Division 7 Thermal & Moisture Protection

5. Division 8 Doors & Windows

- B. Products installed but furnished by others. Architect & Contractor to coordinate these scope areas & designate responsibilities preferably before sub bids:
1. Steel lintels, bolts, anchors specified in Division 05 Section.
 2. Wood nailers and blocking are specified in Division 06 Section.
 3. Vapor and Air Infiltration Barriers: Barrier membranes are specified in a Division 07 Section.
 4. Metal Frames: Hollow metal frames in unit masonry openings, furnished under Division 08 Section.

1.4 REFERENCES

The publications listed below form an integral part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

- A. ACI 530/ASCE 5/TMS 402 Building Code Requirements for Masonry Structures
- B. ACI 530.1/ASCE 6/TMS 602 Specifications for Masonry Structures
- C. Brick Industry Association (BIA) Technical Notes
- D. National Concrete Masonry Association (NCMA) Technical Manual for Concrete Masonry Design and Construction
- E. IMIAWC (CW) Recommended Practices & Guide Specifications for Cold Weather Masonry Construction, International Masonry Industry All Weather Council.
- F. IMIAWC (HW) Recommended Practices and Guide Specifications for Hot Weather Construction, International Masonry Industry All Weather Council
- G. American Society of Testing and Materials (ASTM):
1. ASTM C216-03a, Std. Spec. for Facing Brick (Solid Masonry Units Made from Clay or Shale)
 2. ASTM C 270-03, Std. Spec. for Mortar for Unit Masonry
 3. ASTM C90-03, Std. Spec. for Loadbearing Concrete Masonry Units
 4. ASTM C91-03a Std. Spec. for Masonry Cement
 5. ASTM C150-02ae, Std. Spec. for Portland Cement
 6. ASTM C67-03a, Std. Test Methods for Sampling & Testing Brick
 7. ASTM C140-03, Std. Test Methods for Sampling & Testing CMU's
 8. ASTM C144-03, Std. Spec. for Aggregate for Masonry Mortar
 9. ASTM C476-02, Std. Spec. for Masonry Grout
 10. ASTM C902-02, Std. Spec. for Pedestrian & Lt. Vehicular Paving Brick
 11. ASTM C1272-02, Std. Spec for Heavy Vehicular Paving Brick
 12. ASTM C615, Deformed & Plain Billet Steel Bars for Concrete Reinforcement
 13. ASTM A153, Zinc Coating (Hot-dipped) for Iron & Steel Hardware
 14. ASTM A 82, Std. Spec. for Steel Wire, Plain, for Concrete Reinforcement
 15. ASTM C578-03a, Std. Spec. for Rigid, Polystyrene Thermal Insulation

16. ASTM E119-00a, Std. Test Methods for Fire Tests of Building Construction and Materials

H. **Where the language in any document referred to herein is in the form of a recommendation or suggestion, such recommendations or suggestions shall be deemed to be mandatory under this Contract.**

1.5 SUBMITTALS

- A. Masonry Work: Drawings showing control & expansion joint locations, details of special brick shapes and CMU shapes, with special shape ID numbers, dimensions and locations on the building. At continuous shelf angles, determine if lipped stretcher bricks are required.
- B. Certificates: Certificates of compliance are required attesting that brick, CMU's, cementitious materials for mortar and grout, joint reinforcement, reinforcement bars, control joints, expansion joint material, and insulating materials meet the requirements specified.
- C. Samples: Samples for each brick type, CMU's, control joint, expansion joint, all embedded steel reinforcing and anchoring items, weep joint material, insulation, through wall flashing, submit in sets of 2 to show typical physical characteristics of the items. Submit a box of approximately 24 brick facings to establish range of color and texture.
- D. Test Reports: For each type of facing brick, test reports from an independent laboratory are to be submitted to the Architect/Engineer for approval. Brick test reports shall show:
 - 1. Compressive strength
 - 2. 24 hr. cold water absorption
 - 3. 5 hr. boil absorption
 - 4. Saturation coefficient
 - 5. Initial Rate of Absorption (IRA), or Suction
 - 6. Efflorescence
 - 7. Measurement of Face Brick
 - a. Measurement of size
 - b. Measurement of warpage
 - c. Measurement of length change
- E. CMU test reports shall show:
 - 1. Compressive Strength: Net and Gross.
 - 2. Absorption.
 - 3. Weight.
 - 4. Dimension.

5. Density.

1.6 SAMPLE PANEL

- A. After the material samples are approved, and prior to starting masonry work, a sample panel shall be built on the project site where directed. The project General Contractor and Masonry Subcontractor shall provide a sample panel showing each type of masonry to be used on the project, including exterior wall and interior wall assemblies, weaving them into one large panel in a design similar to the project requirements. Panel shall be L-shaped, at least 6 feet long by 6 feet high, larger if necessary to show all the types of masonry and back-up materials in the design. Panel shall include masonry bonded corner and a bond beam corner if required on the project. Panels shall contain at least a 2 foot square opening at least 2 feet from foundation corners, edges and control joints. Panel shall be of typical wall section thickness for the construction represented. Panel shall show color range, texture, bond, mortar joints and tooling including a sill, a lintel, anchors, reinforcement, wall ties, grouting, flashing systems, insulation, air & moisture barrier system, parging, expansion joints, control joints, sealant, weep holes and cleaning of masonry as required in the work. Where cavity wall construction is required, the contractor shall demonstrate for approval, the method of bringing wythes up together or separately, with insulation and ties as specified. Also demonstrate a provision to keep cavity clear of mortar droppings. Erection of permanent masonry work will not be permitted until the sample panel is approved. **Note: Do not call the architect for inspection and approval of the completed field panel until the final cleaning has been performed and the panel is dry enough to judge.**

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered, handled and stored in a manner to avoid chippage, breakage and contact with soil or contaminating material.
- B. Glazed, glass and prefaced units shall be stored with finish surfaces covered.
- C. Anchors, ties and joint reinforcement shall be stored in a dry location. Reinforcing bars shall be kept free of loose scale and rust.
- D. Cementitious materials shall be delivered in unopened containers plainly marked and labeled with manufacturer's names and brands. Cementitious materials shall be stored in dry, weathertight enclosures or covers. Sand shall be stored in a manner to prevent contamination.

1.8 QUALITY CONTROL

- A. General: Provide and maintain an effective QC program, and perform inspections and surveys of all items of Work, including those of other trades, to ensure compliance with Contract Documents. Furnish appropriate facilities, accurately calibrated instruments and

devices to perform the QC operations and with sufficient work forces to cover the construction operations within the actual construction sequences.

- B. Comply with provisions of the following standards and **maintain at least one copy of each document on the project site:**
 - 1. ACI 530/ASCE 5/TMS 402
 - 2. ACI 530.1/ASCE 6/TMS 602.
- C. Source Limitations for Masonry Units: Obtain exposed masonry units with a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, through one source from a single manufacturer for each product.
- D. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.
- E. Fire Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire resistance ratings determined per ASTM E119 by a testing and inspection agency, by the BOCA equivalent thickness of concrete masonry units, or by other means, as accepted by the Contracting Officer.

1.9 PROJECT CONDITIONS

- A. Protection of Masonry
 - 1. Wall covering:
 - a. During erection, cover top of wall with strong waterproof membrane at end of each day or shutdown.
 - b. Cover partially completed walls when work is not in progress.
 - c. Extend cover minimum of 24" down both sides and hold securely in place.
 - 2. Stain Prevention:
 - a. Prevent grout, mortar and soil from staining exposed masonry walls.
 - b. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread on ground and over wall surface.
 - c. Protect sills, ledges and projections from mortar droppings.
 - d. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from spattering dirt and mortar onto completed masonry walls.
- B. Cold Weather Protection
 - 1. Use procedures outlined in the IMIAWC Cold Weather recommended practices.
 - a. If ice or snow has formed on masonry bed, remove by carefully applying heat until top surface is dry to the touch.
 - b. Remove all masonry deemed frozen or damaged.
 - c. Use dry masonry units.
 - d. Do not use wet or frozen units.

2. Construction Requirements While Masonry Work is Progressing
 - a. **Air temperature 40°F to 32°F:** Heat sand or mixing water to produce mortar temperatures between 40°F and 120°F.
 - b. **Air temperature 32°F to 25°F:** Heat sand and mixing water to produce mortar temperatures between 40°F and 120°F. Maintain temperatures of mortar on boards above freezing.
 - c. **Air temperature 25°F to 20°F:** Heat sand and mixing water to produce mortar temperatures between 40° and 120°F. Maintain mortar temperatures on boards above freezing. Use salamanders or other heat sources on both sides of walls under construction. Use windbreaks when wind is in excess of 15 mph.
 - d. **Air temperature 20°F and below:** Heat sand and mixing water to produce mortar temperatures between 40°F and 120°F. Provide enclosures and auxiliary heat to maintain air temperature above 32°F. Minimum temperature of masonry units when laid: 20°F.
3. Protection Requirements for Newly Completed Masonry
 - a. **Mean daily air temperature 40°F to 32°F:** Protect masonry from rain and snow for 24 hr. by covering with weather-resistive membrane.
 - b. **Mean daily air temperature 32°F to 25°F:** Completely cover masonry with weather-resistive membrane for 24 hr.
 - c. **Mean daily air temperature 25°F to 20°F:** Completely cover masonry with insulating blankets or equal protection for 24 hr.
 - d. **Mean daily air temperature 20°F and below:** Maintain masonry temperature above 32°F for 24 hr. by enclosure and supplementary heat, or electric heating blankets, or infrared lamps, or other approved methods.

PART 2 – PRODUCTS

2.1 CONCRETE MASONRY UNITS

- A. Provide block conforming to ASTM C-90 & as follows:
 1. Weight classification: Normal weight or lightweight CMU's for loadbearing & non-loadbearing walls.
 2. Where fire-rated construction is indicated, use fire-rated lightweight block in accordance with BOCA's minimum equivalent thickness method of determining fire resistivity per the table below.
 3. Note: Type classifications have been removed from C-90, resulting in changes throughout the standard that include the deletion of a table for moisture content requirements for formerly designated Type 1 units.

FIRE RATINGS OF CMU'S FOR BOCA CODE

<u>Nominal Block Size</u>	<u>Equivalent Thickness</u>	<u>Normal Wt.</u>	<u>Lightweight</u>
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6 x 8 x 16 Hollow	3.16"	*	*
6 x 8 x 16 68% solid (semi-solid)	4.02"	*	2 hr.
8 x 8 x 16 Hollow	4.12"	*	2 hr.
8 x 8 x 16 60% solid	4.35"	2 hr.	2 hr.
8 x 8 x 16 75% solid (semi-solid)	5.77"	3 hr.	4 hr.
10 x 8 x 16 Hollow	5.02"	2 hr.	3 hr.
12 x 8 x 16 Hollow	5.77"	3 hr.	4 hr.
12 x 8 x 16 75% solid (semi-solid)	8.74"	4 hr.	4 hr.

BOCA NATIONAL BUILDING CODE MINIMUM EQUIVALENT THICKNESS INCHES
TABLE 902.1.3

	4 hrs.	3 hrs.	2 hrs.	1 ½ hrs.	1 hr.	¾ hr.	½ hr.
Normal Weight (Calcareous gravel)	6.2"	5.3"	4.2"	3.6"	2.8"	2.4"	2.0"
Lightweight (Expanded shale, clay)	5.1"	4.4"	3.6"	3.3"	2.6"	2.2"	1.8"

- B. Provide specially made CMU's for corners, lintels, jambs, sash, control joints, bond beams, 45° external corners, bullnose conditions & any other special conditions. Provide specially cast 45° angle units where angled change in direction is required in exposed wall locations. Field cutting of units to form angles will not be permitted.

2.2 CLAY FACING BRICK – EXTERIOR WALLS

- A. Provide brick conforming to ASTM C-216, Grade SW (Severe Weathering).
- B. Type (FBX, FBS, FBA) to be determined by the requirements of the architectural design:
1. Type **FBX**: Brick for general use in masonry where the architectural design requires a higher degree of precision and lower permissible variation in size than permitted for Type FBS.
 2. Type **FBS**: Brick for general use in masonry.
 3. Type **FBA**: Brick for general use in masonry selected to produce characteristic architectural effects resulting from nonuniformity in size and texture of the individual units.

For this project, the brick shall be Type **FBA** waterstruck brick as selected by the Architect & Owner from the range of colors manufactured by:

Vermont Brick Manufacturing
P.O. Box 330
Highgate Center, VT 05459

Tel: 802 – 868 - 5354
Fax: 802 – 868 - 5438

And represented by:

Trowel Trades Supply, Inc.
71 Troy Avenue
Colchester, VT 05446

Tel: 802 – 655 - 3166
Fax: 802 – 655 - 5841

- C. Brick Size to be determined by the requirements and details as illustrated in the architectural and structural drawings.
- D. Provide special shaped bricks at all obtuse external angles. Sawcut mitered brick will not be permitted at these locations.
- E. Provide factory made lintel bricks at shelf angles.
- F. Provide brick similar in color, texture and physical properties to those available for inspection at the Architect's office.
- G. Wherever shown to "match existing", provide face brick of matching color, texture and size as the existing adjacent brickwork.
- H. Masonry product specification should list: Manufacturer, product nomenclature, type and size.

2.3 CLAY PAVING BRICK

- A. For Pedestrian and Light Vehicular Paving Brick, conform to the specifications as outlined in ASTM C 902, Class SX, where brick may be frozen while saturated.
- B. For Heavy Vehicular Paving Brick, conform to the specifications as outlined in ASTM C 1272.
- C. Application:
 - 1. Application **PS**: Pavers intended for general use, suitable for use on flexible and rigid bases. If laid hand tight without mortar joints in a pattern more complex than running bond, then specify 4"x 8" size.
 - 2. Application **PX**: Pavers intended for use where dimensional tolerances, warpage and chippage are strictly limited. Specify PX pavers when using an asphalt base with brick pavers laid in an asphalt mastic setting bed. This setting method requires paving brick of uniform thickness. Specify 4"x 8" size for hand tight patterns other than running bond.
 - 3. Application **PA**: Pavers intended to produce characteristic effects resulting from nonuniformity in size, color and texture. There are no limitations on warpage, chippage and dimensional variation.

For this project, the paving brick shall be Class **SX**, application **PA**, with a **Type I** abrasion resistance, **4" x 8" x 2-1/4"** waterstruck paving brick as selected by the Architect & Owner from the range of colors manufactured by:

Vermont Brick Manufacturing
P.O. Box 330
Highgate Center, VT 05459

Tel: 802 – 868 – 5354
Fax: 802 – 868 – 5438

And represented by:

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2.4 MORTAR AND GROUT MATERIALS

A. Mortar Materials:

1. Portland Cement: ASTM C 150 Type I or Type III.
 - a. **Recommended Portland Cement-Lime** mortar premix for Type S applications requiring cement-lime mortar:
 - ASTM C270-03a:
 1. Lafarge Eagle Bond Type S Gray
 2. Lehigh Cement-Lime Colored Mortar N or S
 - b. **Recommended Masonry Cement** mortar premix for Type N or S applications:
 - ASTM C91-03a:
 1. Lafarge Masonry Cement Types N & S
 2. Glens Falls Ironclad Type N Lt. & Type N Dark
 2. Hydrated Lime: ASTM C 207, Type S.
 3. Masonry Sand: ASTM C 144.
 4. Admixtures: No air-entraining admixtures or materials containing air entraining admixtures, e.g., powdered soap or detergents.
 5. No antifreeze compounds shall be added to mortar.
 6. No admixtures containing chlorides shall be added to mortar.
 7. Water: clean and potable.
 8. Mortar Pigment: ASTM C979. Pigment shall not exceed 10% of the weight of the Portland cement.

B. Grout Materials

1. Portland Cement: ASTM C150.
2. Hydrated Lime: ASTM C 207, Type S.

C. Aggregate: ASTM C 404.

1. Coarse Aggregate: ASTM C404.

2. Water: Clean and Potable.

2.5 MORTAR MIX

- A. Mortar: ASTM C 270, proportion specification. Type N for typical brick veneer applications; although type S is sometimes advised with certain low suction bricks to enhance Brick/Mortar compatibility and mortar set. Type S for loadbearing masonry
- B. Colored Mortar Mix: Premixed cement as required to match Architect's color sample.
Recommended Colored Mortar Products:
 1. Lehig Premixed Colored Masonry Cements and Colored Cement-Lime mixes
 2. SGS Pigments to be added to Masonry Cement or Cement-Lime mortars

2.6 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615/A 615M Grade 40 deformed billet bars; galvanized.
- B. Single Wythe Joint Reinforcement: Truss type; ASTM A 82 steel wire, hot dip Galvanized after fabrication to ASTM A 153/A 153M, Class B; .1483" side rods with .1483" cross rods; width as required to provide not more than 1" and not less than ½" of mortar coverage on each exposure.
- C. Multi-Wythe Joint Reinforcement: Ladder Type when using eye and pintle type multi-wythe brick and block reinforcing. The ladder type facilitates grouting and is actually more compatible structurally with the brick veneer. ASTM A 82 steel wire, hot dip galvanized. Another option for multi-wythe brick and block cavity wall anchoring is the Fero Block Shear Anchor.
- D. Masonry Veneer Anchors at Steel Stud Backup: 2-piece anchors that permit differential movement between masonry and building frame; hot dip galvanized.
 1. At steel stud backup, it is recommended to locate at least 2" of XPS rigid insulation in the cavity over an air/vapor membrane, which is applied to the sheathing.
 2. Products facilitating good cavity wall construction with unlimited size of rigid wall insulation and air space configuration can be specified from the Fero Corp. www.ferocorp.com. Other good anchoring products for brick veneer on steel stud backup are available from Durowal and Hohmann & Barnard.

2.7 THROUGH-WALL MASONRY FLASHING

- A. Hyload Elvaloy compound membrane flashing; thickness 40 mil. minimum. Specify black, gray or white to best compliment architectural design. Flashing types for:

1. Brick veneer steel stud backup: Elvaloy Surface-adhered S/A flashing with built-in drip edge.
 - a. With S/A flashing, apply Surface Primer on sheathing before adhering the flashing to the sheathing.
 2. Brick veneer block backup: Elvaloy membrane.
- B. Provide pre-formed cloaks to detail corners, level changes, stop ends and special applications. Standard type cloaks are available for most conditions. Special designs are available to meet the design requirements.
- C. Hyload Mastic should be used at all laps and joints in the Membrane.

2.8 CAVITY WALL INSULATION

- A. Rigid, closed cell extruded polystyrene with integral high density skin complying with ASTM C578, Type IV, 25 psi. with appropriate joint sealer between sheets and at building corners.
- B. For CMU backup, a compatible adhesive is bituthene adhesive.
- C. For steel stud backup, use insulation retaining clips similar to Fero insulation supports.
- D. Air Vapor Barrier should be applied at the warm side of the insulation onto the CMU backup or the sheathing covering the steel stud backup.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Preformed control joints: Rubber material complying with ASTM D 2240, Shore A hardness approx. 80.
- B. Compressible Joint Filler: premolded filler strips compressible up to 35% of width and thickness indicated, formulated from neoprene, urethane or PVC.
- C. Weep Holes: Flexible head joint fillers like Mortar Net Weeps or rigid Cell Vents to be installed **at 16" O.C.** Plastic tubes will not be permitted as weeps in masonry cavity walls. They make a perfect home for insects and are easily clogged.
- D. Cavity Drainage Material: free-draining mesh made from polyethylene strands; dove-tail shaped to avoid being clogged by mortar droppings. Specify appropriate thickness required to fill the cavity.

2.9.1 MASONRY CLEANERS

- A. Consult brick supplier for the masonry cleaner and cleaning method most compatible with the masonry units specified.

- B. Always perform a test cleaning in an inconspicuous area of the building before proceeding with the final washdown.
- C. In general, the cleaning guidelines contained in BIA Tech Note 20 will apply:

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with the Mason Contractor present, for compliance with requirements for installation tolerances and other conditions affecting correct performance.
 - 1. For the record, prepare written report, endorsed by the Mason Contractor, listing conditions detrimental to performance.
 - 2. Verify that foundations, shelf angles, and masonry bearing surfaces are within tolerances specified.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Comply with the applicable provisions and recommendations of the related documents as referenced in the Paragraph “References” in Section 1.4.
- C. Before installation, examine rough-in and built-in construction to verify actual locations of piping connections.

3.2. PREPARATION

- A. Cover all brick and concrete masonry units stored on site to protect from weather. If brick and block are delivered to site in wet condition, allow to dry out on dry days, then cover to protect from subsequent rain and weather. Keep material covered and stored on raised wooden pallets.
- B. Clay brick shall have suction sufficient to hold the mortar and to absorb water from the mortar, but shall be damp enough to allow the mortar to remain in a plastic state to permit the brick to be leveled & plumbed immediately after being laid without destroying bond.
- C. Provide effective method of protecting base of finished masonry walls from mud splatter during construction. The method used should continue to provide mud splatter protection throughout the progress of the project until final finished surfaces are completed on the ground at the wall base areas.

3.3 GENERAL ERECTION REQUIREMENTS

- A. Lay masonry plumb, true to line with level and accurately spaced courses: corners plumb

and true, each course breaking joint with the course below, except as may be otherwise indicated or specified. Maintain plumb bond.

- B. Anchor, tie, reinforce and bond masonry at corners and intersections in accordance with the applicable requirements of ACI 530.1/ASCE6/TMS 602. A copy of this document will be provided by the mason contractor and kept in the job trailer during construction.
- C. Step back unfinished work for joining with new work. Tothing will not be permitted.
- D. Select masonry units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- E. Cutting, patching and repairing in connection with masonry work as required to accommodate the work of other trades shall be performed under this Section.
- F. Use motor driven diamond saws designed to cut masonry units with clean sharp corners. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full units without cutting wherever possible. Avoid the use of less than half-size units at corners, jambs and other locations.
- G. Mortar Joints: Tool exposed joints slightly concaved, unless otherwise indicated. For surfaces to be plastered, rake joints to obtain bond. Lay masonry units with uniform joint widths. Tool joints to squeeze mortar back into joints. Tool after mortar has taken its initial set.

3.4 CAVITY WALL CONSTRUCTION

- A. Construct cavity walls as shown, consisting of an outer wythe of face brick, an air space, cavity insulation, weepholes, fillers, flashings, air/vapor barrier and an inner wythe of CMU. The outer and inner masonry wythes shall be tied together.
- B. Care shall be taken to keep the cavity space free from mortar droppings and the weep holes clear and functioning. The contractor shall demonstrate in the early stage of masonry cavity wall construction the technique used to accomplish this requirement.
 - 1. Keep cavity in cavity walls clean by:
 - a. Slightly beveling mortar bed to incline toward cavity
 - or-
 - b. Placing wood strips with attached wire pulls on metal ties to catch droppings.
 - c. As work progresses, trowel protruding mortar fins in cavity flat against the inner face of the brick wythe.
- C. At bottom terminations of cavity, install through wall flashing continuously with weep

- holes. Provide weepholes at bottom of cavity, 16" O.C. if rope wicks and 24" O.C. if open head joint weeps. Fill open head joint weeps with plastic cell weep vents or fibrous Mortar Net open head joint weephole fillers.
- D. Install flashing system carefully to maintain cavity wall drainage. Cut flashing off flush with face of exterior wythe after masonry wall construction is completed.
 - E. At the bottom terminations of the cavity and at all other flashing locations, install continuous cavity drainage filter material on top of flashing extending the full width of the cavity and a minimum of 8" vertically within the cavity. Provide end dams at flashing terminations.
 - F. Provide continuous cavity insulation and air barrier system within the cavity in accordance with Section 7: Air/Vapor Barrier System. Coordinate installation sequence with flashing and other materials in cavity wall construction.

3.5 CLAY BRICK

- A. Brick with frogging shall be laid with the frog side down and the better or face side exposed to view. Brick that is cored, recessed, or otherwise deformed, shall not be used in sills, treads, soldier courses where these deformations will be exposed to view.
- B. Lay brick in one-half running bond with approximately 3/8" wide mortar joints to course out at three brick coursed per 8", unless otherwise indicated on the Drawings. Do not use bats in face brick work except as otherwise directed to carry out the designs.
- C. Set brick in full bed of mortar. Do not furrow mortar beds.
- D. Leave an open and clear joint at all control joint locations in exterior brick walls, left clean and ready for control joint material, backer rod and sealant under Section "Caulking and Sealants".
- E. Butter ends of brick with sufficient mortar to assure FULL HEAD JOINTS. **Do not slush head joints with mortar.**
- F. Do not pound corners and jambs to fit stretcher units after they are set in position. When an adjustment must be made after mortar has started to harden, remove mortar and replace with fresh mortar.

3.6 CONCRETE MASONRY UNITS

- A. Erect concrete masonry units where shown. Solidly bed each course in mortar. Butter vertical joints THEIR ENTIRE LENGTH. Bond each course at corners and intersections and bond into or anchor to adjacent construction with metal anchors spaced not over 32" O.C. in both directions.

- B. Provide lightweight hollow loadbearing units for the following:
1. Interior loadbearing and interior non-loadbearing walls.
 2. Interior wythe of exterior brick cavity walls
 3. All CMU with grouted cells.
 4. All CMU with sand filled cells for sound dampening.
 5. All CMU walls not otherwise noted.
- C. Provide lightweight solid loadbearing units for the following:
1. All exterior bearing walls, not grouted.
 2. All CMU back-up for stone facing, not grouted.
 3. Enclosing walls of elevators, shafts and stairwells, not grouted.
 4. For fire-rated walls and partitions when hollow units, or grouted hollow units do not meet the requirements in the thicknesses indicated.
- D. Provide normal weight hollow loadbearing units for the following:
1. All exterior CMU walls and parapets exposed in the finished work.
- E. Set CMU's with care around frames so as not to bulge the sides or change the position of the frames. Break joints in units set around the tops of door frames so as to minimize the danger of loosening the units due to door jarring. Set units tightly against metal frames and fill voids completely. Build frame anchors into joints. Cut units accurately to fit around pipes, ducts, openings, etc. and fill voids full. Fill jambs and head of hollow metal frames solid with mortar.
- F. Build partitions of thicknesses shown. Give sufficient opportunity to the various trades to install built-in work before proceeding with the partitions, leaving openings where required for testing, etc., such openings to be closed up later.
- G. Construct masonry partitions full height and terminate with a one inch, minimum space between top of masonry and the structure above.
1. Leave top of partitions joint open except at the following locations as follows:
 - a. Seal top of partitions to structure at all fire-rated partitions with materials as specified in Section 7—Firestopping.
 - b. Seal joints exposed to view in the finished work with sealant and joint fillers as specified in Section 7—Caulking and Sealants.

3.6.1 JOINT REINFORCEMENT

- A. Place joint reinforcement in horizontal mortar joints at 16" O.C. unless otherwise shown. Make reinforcements continuous except at control joints. Lap reinforcements 6" at ends

and use prefabricated T and L sections at corners and intersections to provide continuity. Provide reinforcement in first and second bed joints above lintels and below sills extending 2' beyond jamb openings.

- B. Control joints: Construct continuous control joints to provide an unbroken vertical separation through the entire thickness of walls, in the manner shown by the details and at locations shown. Where locations are not shown, construct control joints throughout the unbroken length of interior walls at distances no greater than twenty-five (25) feet O.C.
- C. Lintels: Provide concrete masonry lintels consisting of specially formed units, with reinforcing bars and mortar fill, wherever shown and wherever openings in concrete masonry of more than 1 foot are shown without structural steel or other supporting lintels. Unless otherwise noted, provide one bar for each 4" thickness of wall, and use bars of a size number not less than the number of feet of opening width. Provide minimum lintel bearing at each jamb of 4" for openings which do not exceed 6 ft. and 8" for openings in excess of 6 ft. Precast lintels or form lintels in place with adequate temporary support. Cure precast lintels thoroughly before handling and installing.
- D. Reinforcement placement: Clean reinforcement of loose rust, mill scale and other deleterious material. Do not use reinforcement with kinks or reduced cross-section due to excessive rusting or other causes. Do not use reinforcement with bends other than shown on final Shop Drawings.
 - 1. Position reinforcement accurately at spacing shown. Support and secure bars against displacement. Provide laps of dimension shown, or if not shown, as required by governing authority.
- E. Anchoring: Anchor masonry work to supporting structure as indicated. At intersection of reinforced masonry walls with non-reinforced masonry, provide anchorage as shown.

3.6.2 INSTALLATION OF REINFORCED CONCRETE MASONRY

- A. Lay CMU units with full-face shell mortar beds. Fill vertical head joints (end joints between units) solidly with mortar from face of unit to a distance behind face equal to not less than the thickness of longitudinal face shells. Solidly bed cross webs of starting courses in mortar. Maintain head and bed joint widths shown, or if not shown, provide 3/8" joints.
 - 1. Walls
 - a. Pattern Bond: Lay CMU wall units in half running bond with vertical joints in each course centered on units in courses above and below. Bond and interlock each course at corners and intersections. Use special shaped CMU's where shown, and as required for corners, jambs, sash, control joints, lintels, bond beams and other special conditions.

- b. Maintain vertical continuity of core or cell cavities, which are to be reinforced and grouted, to provide minimum clear dimensions indicated and to provide min. clearance and grout coverage for vertical reinforcement bars. Keep cavities free of mortar. Solidly bed webs in mortar where adjacent to reinforced cores or cells.
- c. Where horizontal reinforced beams (bond beams) are shown, use special units to allow for placement of continuous horizontal reinforcement bars. Place small mesh expanded metal lath or wire screening in mortar joints under bond beams over cores or cells of non-reinforced vertical cells, or provide units with solid bottoms.

2. Grouting

- a. Use “Fine Grout” for filling spaces less than 4” in both horizontal directions.
- b. Use “Course Grout” for filling spaces 4” or larger in both horizontal directions.

3. Low-lift Grouting

- a. Provide min. clear dimension of 2” and clear area of 8 square inches in vertical cores to be grouted.
- b. Place vert. reinforcement prior to laying of CMU. Extend above elevation of max. pour height as required to allow for splicing. Support in position at vertical intervals not exceeding 192 bar diameters nor 10 feet.
- c. Lay CMU to max. pour height. Do not exceed 5 feet height, or if bond beam occurs below 5 feet height, stop pour at course below bond beam.
- d. Pour grout using container with spout or chute. Rod or vibrate grout during placing. Place grout continuously. Do not interrupt pouring of grout for more than one hour. Terminate grout pours 1-1/2 inch below top course of pour.
- e. Bond beams: Stop grout in vertical cells 1-1/2” below bond beam course. Place horizontal reinforcement in bond beams: lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

3.7 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing and CMU backup with masonry veneer anchors with the following requirements:
 - 1. Fasten anchors through sheathing to wall framing or to concrete backup metal fasteners of type specified.
 - 2. Locate anchor sections to allow maximum differential movement of ties up and down.
 - 3. Space anchors as required by ACI 530 Code and the engineered anchoring design.

3.8 DISCONTINUOUS WORK

- A. When necessary to temporarily discontinue the work, masonry units shall be stepped back for joining when work resumes. Tothing may be resorted to only when specifically approved. Before resuming work, loose mortar shall be removed and the exposed joint shall be thoroughly cleaned.
- B. Tops of walls exposed to rain or snow shall be covered with nonstaining waterproof covering or membrane when work is not in progress. Covering shall extend a minimum of 2 feet down on each side of the wall and held securely in place.

3.9 REPAIRING, POINTING & CLEANING

- A. Cut out any defective joints and holes in exposed masonry and repoint with mortar. Remove and replace masonry units that are loose, broken or otherwise damaged. Install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings and adjacent construction, to provide a neat, uniform appearance.
- C. Properly prepare joints for sealant application, removing any hardened mortar bridging the clear joint.
- D. In progress cleaning: Clean exposed unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- E. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry

as follows:

1. Remove large mortar particles with wooden scrapers.
2. Test cleaning methods on sample panel: leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample wall cleaning before proceeding with final cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with clear water.
5. Clean brick by bucket and brush hand cleaning method as outlined in the BIA Tech Note #20, using job mixed detergent solution.
6. Use of pressure washing method is subject to approval of test wall cleaning and demonstration of successful use of this method on past projects.
7. Clean masonry surfaces with a proprietary acidic cleaner applied according to the manufacturer's written instruction. Choice of cleaner is based on recommendation of masonry unit manufacturer.

End of Section 04810—Unit Masonry Assemblies